The activity of a volcano can be characterized by the slow emission of modest quantities of magma with limited effects on the environment or, on the contrary, by catastrophic, eruptive events capable of radically altering the surroundings of the volcano and affecting the climate also at the global level.

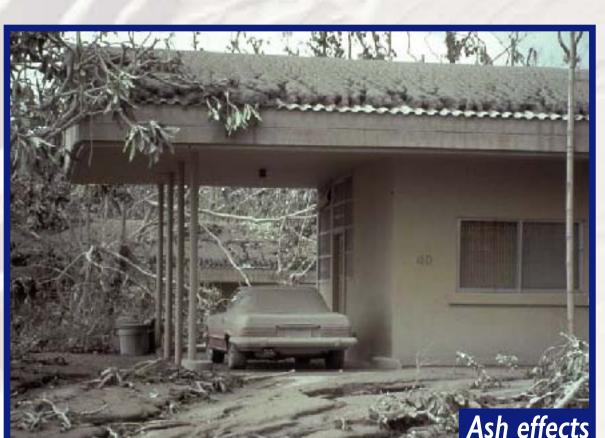
Catastrophic events generally take the form of highenergy explosive eruptions during which huge amounts of volcanic material are emitted. Effusive eruptions instead have less destructive power, even though they can be characterized by the emission of huge volumes of lava. Thus volcanic hazards are mainly related with explosive eruptions.

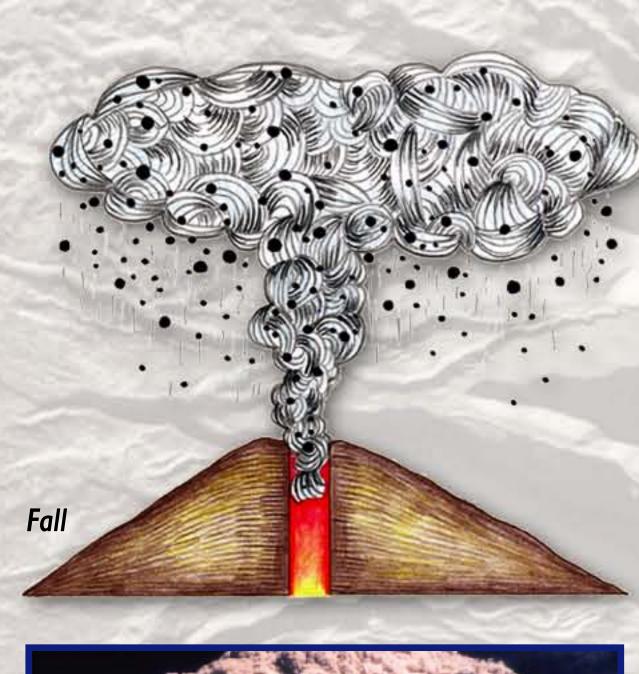


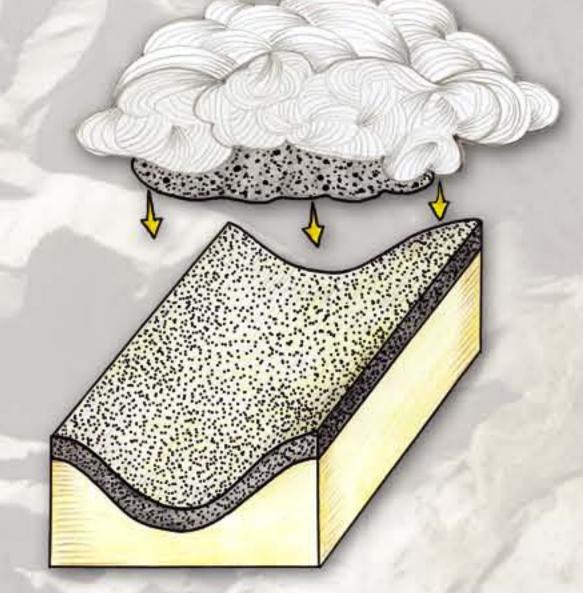
## **Volcanic hazards**

Pumice and ash fall deposits can cover large areas, mainly in respect to wind direction. These deposits can reach such thickness and weight to damage building's roofs, even causing their collapse. Volcanic ash is highly dangerous in particular due to its ability to infiltrate and fill every empty space and to its abrasive character. It can also cause respiratory problems and reduced visibility as well as significant damage to the engines of cars and airplanes.

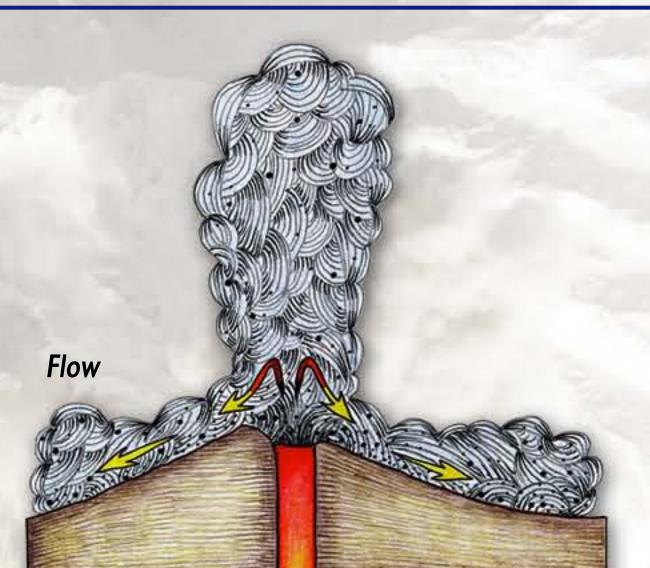


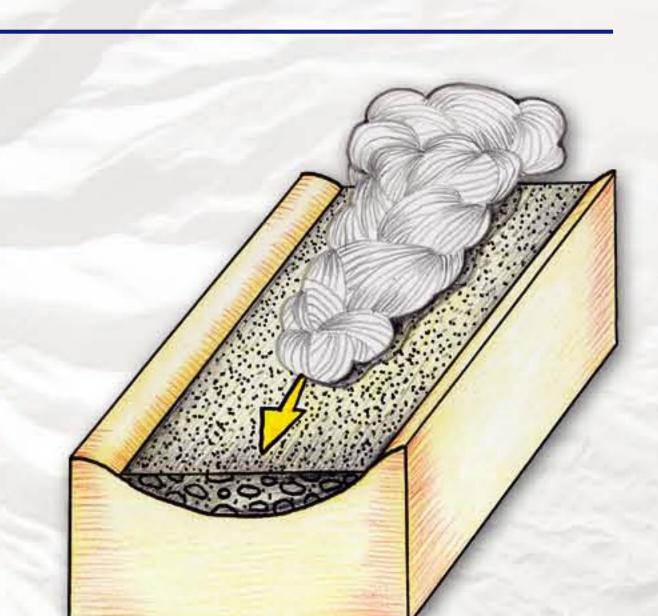










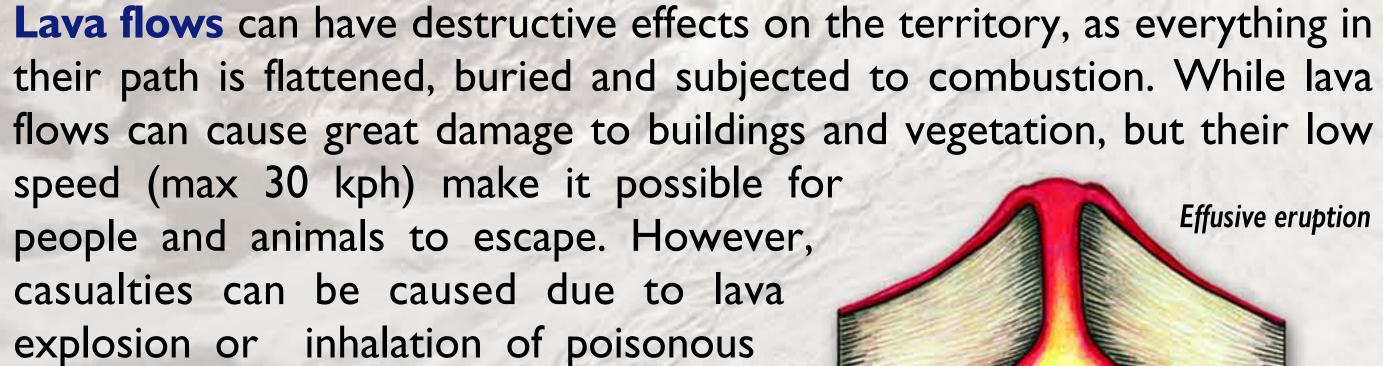


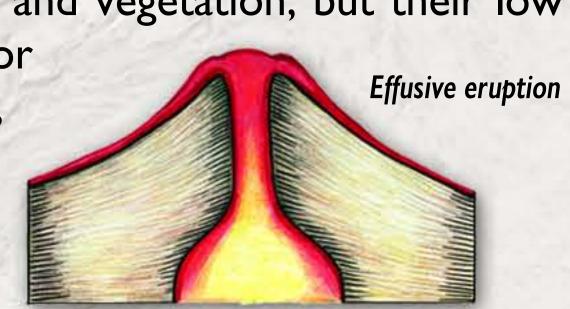




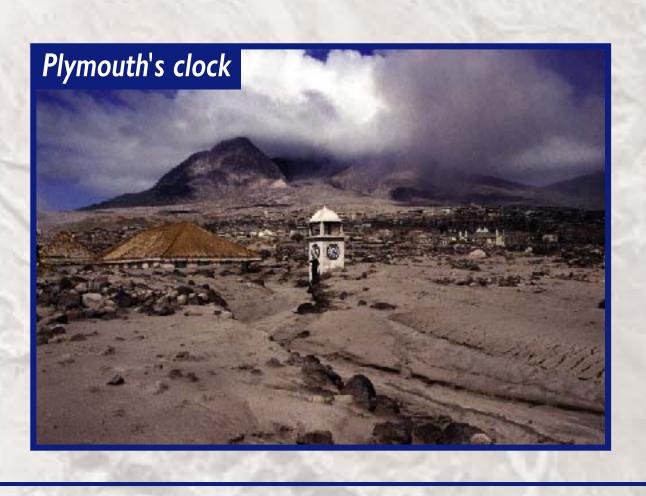
Pyroclastic flow A pyroclastic current is a mixture of gas and particles at high temperature (between 200 and 700°C), which can set fire to buildings and materials. While pyroclastic flows vary considerably in size and speed (generally in excess of 80 kph), even those of limited

scale can cause the destruction of buildings, forests and crops.











gases released.





Lahar is an Indonesian word to define a debris flow composed of pyroclastic material mixed to water. It can originate as a direct and immediate result of an eruption or time after the eruption occurred as result of mobilization of loose tephra by heavy rain or meltwater on steep slopes of volcanoes. Lahar flows at high velocities in the gullies of the volcano and expand in the alluvial plain till tens of kilometers far from volcano causing great economic and environmental damages.





## **Volcanic** winter

It has been documented that large volcanic eruptions, such as Tambora (1816 AD), Krakatoa (1883 AD) or Pinatubo (1991 AD) can cause severe climate changes in global scale, expressed by a long term sudden decrease

of atmospheric temperature. This phenomenon, described as volcanic "winter" is the result of mainly plenian eruptions and the emission up to the higher levels of the atmosphere of large amounts of ash and gasses, like aerosols of sulfuric dioxide. Soon after the eruption these products can fully cover the Earth. Solar energy is either trapped by gasses or dammed by the ash, dropping down surface temperature for several degrees Celsius. Studies on mean tree ring density documented such changes for several years in past.

